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Understanding the Formation of Tornadoes Through Spatiotemporal Relational Data Mining

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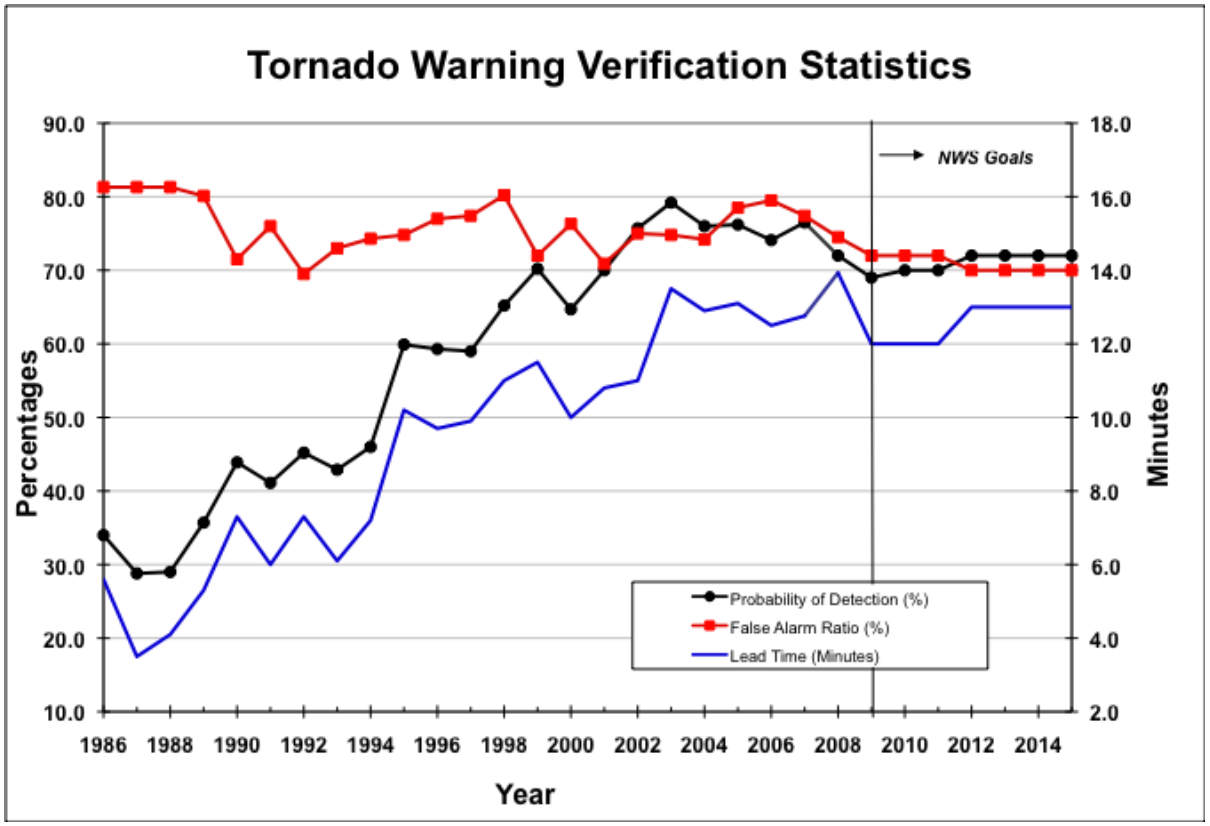
Motivation



- Probability of correctly warning a tornado has improved dramatically
- False alarm rate has stayed steady
- Radar capabilities are at max
- Can we improve our understanding of the formation of tornadoes?

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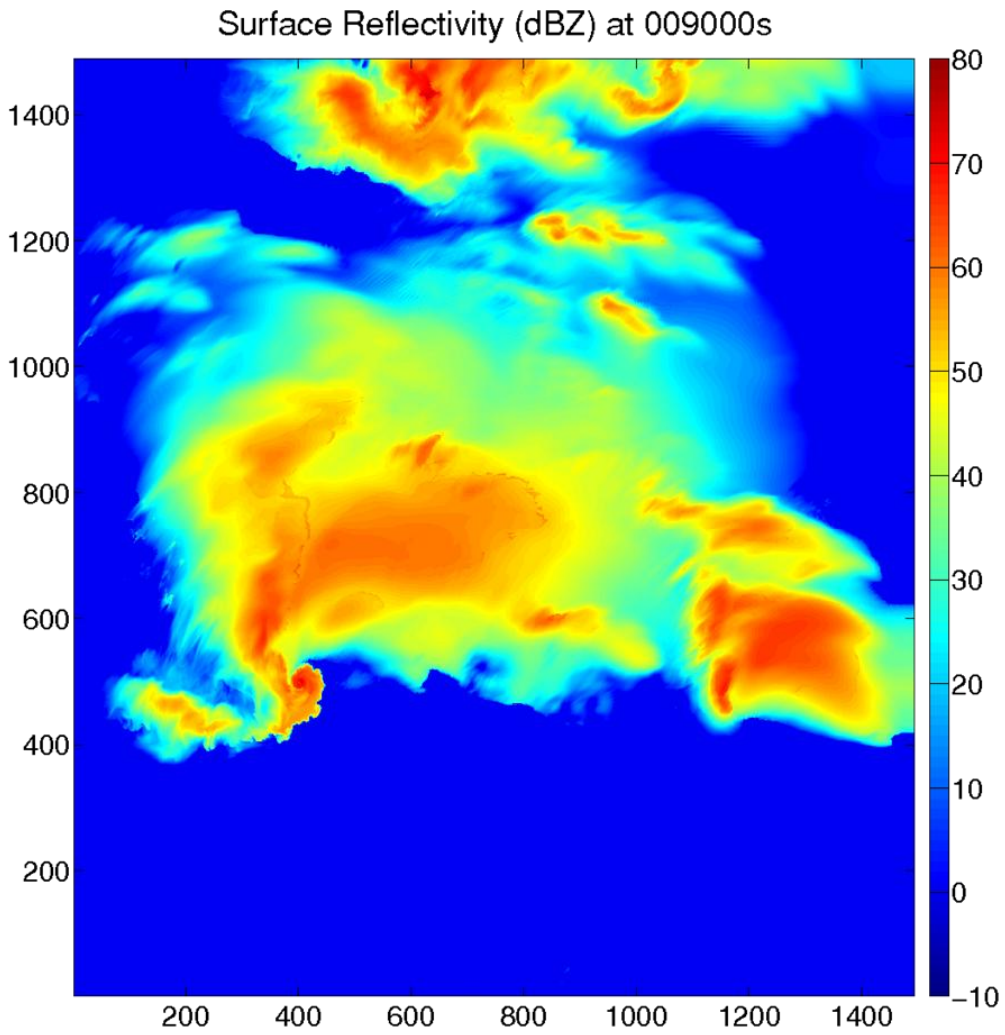
Kraken's role



- **Approach: generating approximately 100 high resolution simulated supercell thunderstorms**
  - **75 m horizontal resolution**
- **Simulations contain all fundamental meteorological quantities**
  - **Simulate 3 hours of storm time**
  - **Save state every 30 seconds**
  - **Approx. 1 TB of data per simulation**

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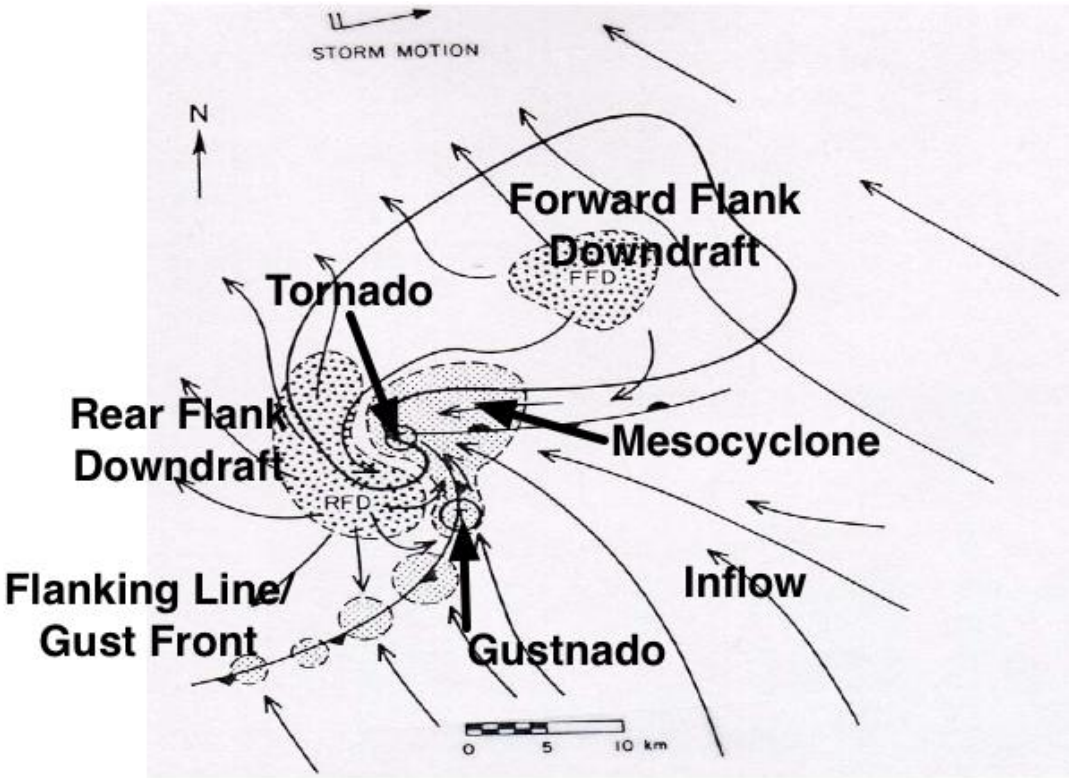
Spatiotemporal relational data mining



- Meteorologists already study storms using high-level objects
  - We seek to study the interaction of these high-level objects over space and time
- Our approach: develop spatiotemporal relational data mining methods capable of handling such data

Adapted from Lemon and Doswell III, 1979; Davies-Jones, 1986; Bluestein, 1993

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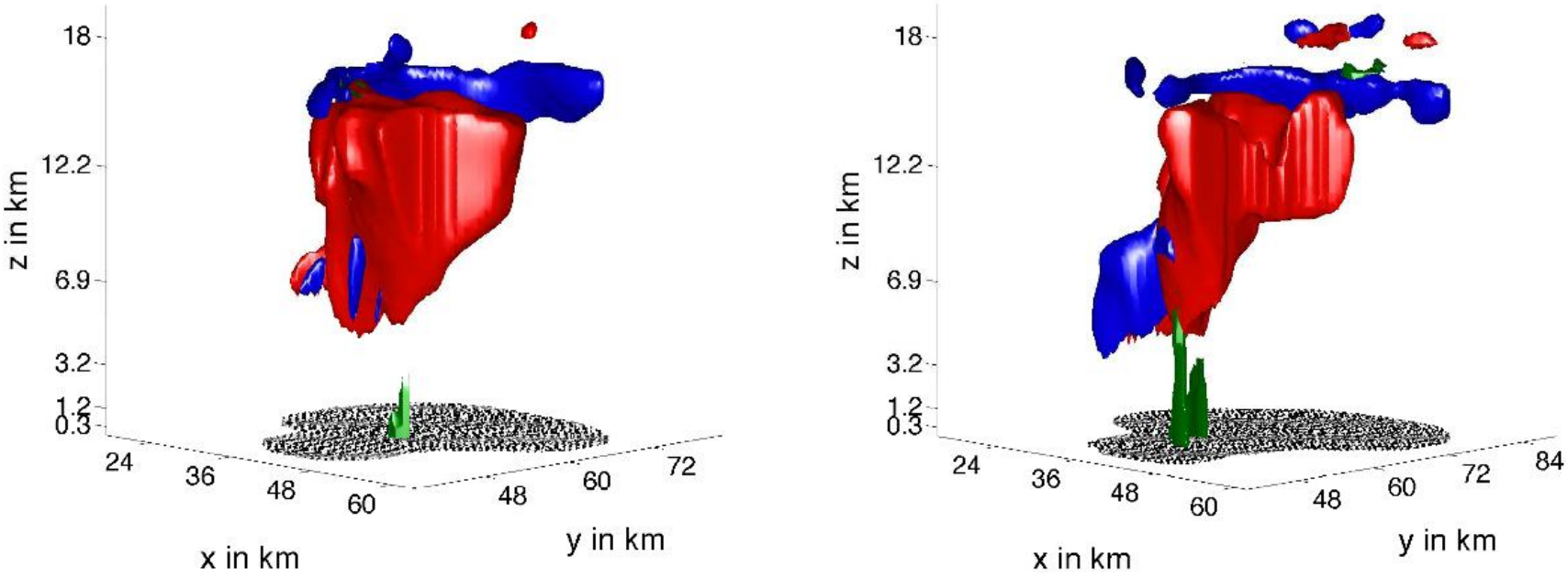
A spatiotemporal relational view



Two views of a simulated supercell
taken 10 minutes apart

Results and acknowledgments

- Results can be found on: www.cs.ou.edu/~amy/career
- Thank you to:
  - National Science Foundation Grant No. NSF/IIS/0746816, NSF/CISE/REU 0453545
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